DOCUMENT RESUME

ED 420 701 TM 028 376

AUTHOR Elmore, Patricia B.; Woehlke, Paula L.

TITLE Twenty Years of Research Methods Employed in "American Educational Research Journal," "Educational Researcher," and "Review of Educational Research."

PUB DATE 1998-04-00

NOTE 21p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Diego, CA, April 13-17, 1998).

PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.

DESCRIPTORS *Educational Research; Literature Reviews; *Qualitative Research; *Research Methodology; *Scholarly Journals; *Statistical Analysis; Tables (Data)

IDENTIFIERS *American Educational Research Journal; *Review of Educational Research

ABSTRACT

Research methods used in articles published in the "American Educational Research Journal" (AERJ), "Educational Researcher" (ER), and the "Review of Educational Research" (RER) were studied for the years 1978 to 1997. Articles were read to identify and categorize the research methods and statistical techniques used in each. A breakdown is provided for each of the journals, with a further division into decades that reflects the increasing use of computer assisted methodology. Results for the AERJ and the three journals combined are consistent with previous research by L. Goodwin and W. Goodwin (1985) in which methods in rank order, are: (1) analysis of variance/analysis of covariance; (2) multiple regression; (3) bivariate correlation; (4) descriptive; (5) multivariate; (6) nonparametric; and (7) t-test. The only major difference with the Goodwin study is the increase in the use of qualitative methods in AERJ over the last 10 years. Meta analysis was the most frequent technique in RER, as is consistent with the journal's editorial policy. The frequency of the use of visual presentation of data suggests the addition of a category for graphic methods. (Contains 5 tables, 7 figures, and 19 references.) (SLD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 420 701

Twenty Years of Research Methods Employed in American Educational Research Journal, Educational Researcher, and Review of Educational Research

Patricia B. Elmore and Paula L. Woehlke
Department of Educational Psychology
and Special Education
Southern Illinois University
Carbondale, IL 62901-4618

Paper Presented at the Annual Meeting of the
American Educational Research Association
San Diego

April, 1998

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
Patricia Elmore
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

TM028376

Twenty Years of Research Methods Employed in American Educational Research Journal, Educational Researcher, and Review of Educational Research

Professors of educational research have the task of teaching methodology including statistics, measurement, and evaluation to each new generation of researchers. In this role they frequently must make difficult decisions about which topics are essential for all educational researchers and should be included in the doctoral tool sequence in statistics and which courses and topics are recommended for specialists in a quantitative doctoral program. Because they have only a limited amount of time available during a 3- or 4-semester-hour course or sequence of courses and because they are expected to provide students with enough expertise to be intelligent consumers as well as producers of research, the choice of topics to cover becomes critical.

An approach to determining the essential topics to be included in the doctoral tool sequence for students preparing to be educational researchers is to conduct a content analysis of the methods and techniques used in published articles in educational research journals. Content analyses of published articles to classify research methods have appeared frequently in the educational and psychological literature (Baumberger & Bangert, 1996; Dillon, 1983; Elmore & Woehlke, 1988, 1996; Goodwin & Goodwin, 1985a, 1985b; Gordon, Nucci, West, Hoerr, Uguroglu, Vukosavich & Tsai, 1984; Schinka,

LaLone, & Broeckel, 1997; Shaver & Norton, 1980; Walberg, Vukosavich & Tsai, 1981; Willson, 1980).

The present authors completed an analysis for the journals published by the American Educational Research Association in 1988 for the previous ten years and in 1996 for the eight years that had elapsed since their 1988 review. It is the intent of this paper to extend our earlier work by providing a comprehensive review of techniques used in the American Educational Research Journal (AERJ), Educational Researcher (ER), and Review of Educational Research (RER) in the twenty years from 1978 to 1997.

Method

All articles appearing in AERJ, ER, and RER for the period from 1978 through 1997 were selected for examination. Book reviews, annual meeting notices, directories and minutes of meetings were omitted from the review.

The coding process included two steps: (a) reading the article to identify every research method or statistical technique used and (b) categorizing all the methods and techniques identified in each article. Where more than one method was employed in a single article, all methods were coded into appropriate categories; as a result, the total coded methods may exceed the total number of articles reviewed. The categories employed to code research methods or statistical techniques used in the articles were:

- Descriptive: frequencies, percentages, ratios, rates, measures of central tendency and variability;
- Bivariate correlation: Pearson product-moment correlation coefficients or other coefficients used with two variables;
- t-test: two-group comparison of means;
- Nonparametric: statistics used with nominal or ordinal data;
- Meta-analysis: syntheses of research using any of three techniques proposed by Glass, McGaw & Smith (1981), Rosenthal & Rubin (1982) and Hedges & Olkin (1985);
- ANOVA/ANCOVA: hypotheses tested for group differences;
- Psychometric theory: application of statistics to the development of measuring instruments;
- Multiple correlation/regression: methods used to relate more than one independent variable to a single continuous dependent variable;
- Multivariate: techniques using more than one dependent variable;
- Factor/cluster: correlational techniques used to isolate subsets of related variables/observations;
- LISREL: analysis of covariance structures using maximum likelihood estimation (e.g., path analysis, confirmatory factor analysis);
- Bayesian: use of Bayesian statistical methods rather than classical Neyman-Pearson;

- Simulation: analysis of simulated rather than empirical data;
- Modeling: empirical test of a theoretical model;
- Qualitative: use of specific techniques associated with educational evaluation (e.g., naturalistic observations, field, ethnographic, phenomenological and case studies);
- Graphic techniques: use of graphic methods such as bar charts, line graphs, scatter diagrams, histograms, stem-and-leaf displays, polygons and box-and-whisker plots.

The first author coded all ER articles and the second author coded all AERJ and RER articles. From their previous studies, the authors felt reasonably certain that the coding system was reliable; however, the authors did consult each other on any questionable procedures. In addition, seven randomly selected articles from Educational Researcher were coded by both authors to assess intercoder reliability. There was perfect intercoder reliability for those articles. The authors used the same coding process and categorization of techniques first developed for the 1978 to 1987 study and further refined in the 1996 paper.

Results

The frequency of research methods or statistical procedures used in AERJ for each of the 10 years from 1988 to 1997, the total number of articles reviewed by year, and the total frequency accumulated for each method across the 10 years are shown in Table 1. The total for the previous 10 years (1978 to 1987) and the accumulated total for 20 years

(1978 to 1997) for each category are reported in the first and last columns, respectively, for comparison. Similarly, the same information for ER, RER, and the three journals combined is contained in Tables 2, 3, and 4, respectively. Table 5 contains the rank order of methods used in AERJ, ER, RER, and the three journals combined for the three time periods (1978 to 1987, 1988 to 1997, and 1978 to 1997). In order for a method to receive a rank, the method had to have a frequency of at least 10.

The six most frequent methods used in AERJ in rank order for the time period 1978 to 1987 were ANOVA/ANCOVA, multiple regression/correlation, multivariate, bivariate correlation, nonparametric, and t-test; for the time period 1988 to 1997 were qualitative, ANOVA/ANCOVA, multiple regression/correlation, multivariate, bivariate correlation, and LISREL, factor/cluster, and t-test tied; and, for the 20-year time period 1978 to 1997 were ANOVA/ANCOVA, multiple regression/correlation, qualitative, multivariate, bivariate correlation, and nonparametric.

The most frequent methods used in ER in rank order for the time period 1978 to 1987 were descriptive, multiple regression/correlation, and bivariate correlation; for the time period 1988 to 1997 were descriptive and graphic methods; and, for the 20-year time period 1978 to 1997 were descriptive, graphic methods, bivariate correlation, and multiple regression/correlation. Since a technique had to have a

frequency of at least 10 to be ranked, fewer than six techniques were ranked for ER.

For RER the most frequent method used across all three time periods was meta-analysis. Since a technique had to have a frequency of at least 10 to be ranked, only one technique was ranked for RER.

The six most frequent methods used in the three journals combined in rank order for the time period 1978 to 1987 were ANOVA/ANCOVA, descriptive, multiple regression/correlation, bivariate correlation, multivariate, and nonparametric; for the time period 1988 to 1997 were descriptive, qualitative, ANOVA/ANCOVA, graphic methods, meta-analysis, and multiple regression/correlation; and, for the 20-year time period 1978 to 1997 were descriptive, ANOVA/ANCOVA, multiple regression/correlation, qualitative, bivariate correlation, and multivariate.

Discussion and Conclusions

The results for AERJ and the three journals combined for all three time periods are similar to those reported by Goodwin and Goodwin (1985a) for the Journal of Educational Psychology from 1979 to 1983 in which the most frequent methods used in rank order were ANOVA/ANCOVA, bivariate correlation, t-test, multiple regression, multivariate, and nonparametric techniques. Similarly, our results for AERJ and the three journals combined are consistent with the findings of Goodwin and Goodwin (1985b) for AERJ from 1979 to 1983 in which the most frequent methods reported in rank order were

ANOVA/ANCOVA, multiple regression, bivariate correlation, descriptive, multivariate, nonparametric, and t-test. The only major difference is the substantial increase in the use of qualitative methods in AERJ over the last 10 years. The frequency for the 10-year period from 1978 to 1987 was four while the frequency for the most recent 10-year time period (1988 to 1997) was 96.

Meta-analysis was the most frequent technique found in RER which is consistent with the journal's editorial policy. The use of meta-analysis in RER has increased over the time periods studied. The frequency for the 10-year period from 1978 to 1987 was 21 while the frequency for the 10-year period from 1988 to 1997 was 46. A report of a committee of the Mathematical Sciences Board of the National Research Council (1992) stated "quantitative research synthesis--meta-analysis--has gained increasing use in recent years and rightly so. Meta-analysis offers a powerful set of tools for extracting information from a body of related research" (p. 2).

In the review of journal articles it was striking to both authors that many articles contained visual presentation of data including bar charts, line graphs, scatter diagrams, histograms, stem-and-leaf displays, polygons, and box-and-whisker plots. Therefore, a new category, graphic methods, was added to the categories already used by Elmore and Woehlke (1988). The importance of exploratory data analysis (Tukey, 1977) and the understanding of graphic methods (Wainer, 1992a, 1992b) for the statistics curriculum (Tukey, 1980) are confirmed

in this study in which descriptive and graphic methods were two of the top ranked methods for ER and all journals combined for 1988 to 1997.

References

Baumberger, J. P., & Bangert, A. W. (1996). Research designs and statistical techniques used in the Journal of Learning Disabilities, 1989-1993. Journal of Learning Disabilities, 29(3), 313-316.

Dillon, J. T. (1983). The use of questions in educational research. Educational Researcher, 12(9), 19-24.

Elmore, P. B., & Woehlke, P. L. (1988). Statistical methods employed in American Educational Research Journal, Educational Researcher, and Review of Educational Research from 1978 to 1987. Educational Researcher, 17(9), 19-20.

Elmore, P. B., & Woehlke, P. L. (1996, April). Research methods employed in American Educational Research Journal, Educational Researcher, and Review of Educational Research from 1978 to 1995. Paper presented at the meeting of the American Educational Research Association, New York, NY.

Glass, G. V, McGaw, B., & Smith, L. I. (1981). Meta-analysis in social research. Beverly Hills, CA: Sage.

Goodwin, L. D., & Goodwin, W. L. (1985a). An analysis of statistical techniques used in the Journal of Educational Psychology, 1979-1983. Educational Psychologist, 20(1), 13-21.

Goodwin, L. D., & Goodwin, W. L. (1985b). Statistical techniques in AERJ articles, 1979-1983: The preparation of graduate students to read educational research literature. Educational Researcher, 14(2), 5-11.

Gordon, N. J., Nucci, L. P., West, G. K., Hoerr, W. A., Uguroglu, M. E., Vukosavich, P., & Tsai, S. (1984). Productivity and citations of educational research: Using educational psychology as the data base. Educational Researcher, 13(7), 14-20.

Hedges, L. V., & Olkin, I. (1985). Statistical methods for meta-analysis. New York: Academic Press.

National Research Council (1992). Combining information: Statistical issues and research opportunities. Washington, DC: National Academy of Sciences Press. [Reprinted as Combining information: Statistical issues and research opportunities. Washington, DC: American Statistical Association, 1993.]

Rosenthal, R., & Rubin, D. B. (1982). Comparing effect sizes of independent studies. Psychological Bulletin, 92, 500-504.

Schinka, J. A., LaLone, L., & Broeckel, J. A. (1997). Statistical methods in personality assessment research. Journal of Personality Assessment, 68(3), 487-496.

Shaver, J. P., & Norton, R. S. (1980). Randomness and replication in ten years of the American Educational Research Journal. Educational Researcher, 9(1), 9-15.

Tukey, J. W. (1977). Exploratory data analysis. Reading, MA: Addison-Wesley.

Tukey, J. W. (1980). We need both exploratory and confirmatory. The American Statistician, 34(1), 23-25.

Wainer, H. (1992a). Prologue--How the following article came to be. Educational Researcher, 21(1), 12-13.

Wainer, H. (1992b). Understanding graphs and tabies. Educational Researcher, 21(1), 14-23.

Walberg, H. J., Vukosavich, P., & Tsai, S. (1981). Scope and structure of the journal literature in educational research. Educational Researcher, 10(8), 11-13.

Willson, V. L., (1980). Research techniques in AERJ articles: 1969 to 1978. Educational Researcher, 9(6), 5-10.

Table 1

Methods Used in American Educational Research Journal

	Year											
Method	78-87	88	89	90	91	92	93	94	95	96	97	88-97	Total
Descriptive	28	1	0	2	2	2	1	2	1	8	3	22	50
Bivariate correlation	47	7	1	5	5	2	2	2	5	3	0	32	79
t-test	42	4	4	4	3	0	2	3	2	2	0	24	66
Nonparametric	46	0	3	0	4	3	2	5	2	0	2	21	67
Meta-analysis	13	0	0	0	0	0	0	0	0	0	0	0	13
ANOVA/ANCOVA	137	10	7	8	11	8	7	7	6	5	6	75	212
Psychometric theory	12	0	0	2	1	0	0	0	0	0	0	3	15
Multiple reg./corr.	95	3	3	2	4	3	3	2	8	6	3	37	132
Multivariate	53	4	3	4	7	3	3	2	4	1	2	33	86
Factor/cluster	30	0	1	2	0	2	3	5	5	1	5	24	54
LISREL	38	4	3	4	3	4	0	1	3	0	2	24	62
Bayesian	1	0	0	2	0	0	0	0	0	0	0	2	3
Simulation	3	0	0	0	0	0	0	0	0	0	0	0	3
Modeling	4	0	1	1	0	0	0	1	0	0	0	3	7
Qualitative	4	5	8	8	11	16	12	7	9	13	7	96	100
Graphic methods	NA	0	0	2	4	0	3	0	0	7	2	18	18
Total articles reviewed	396	28	17	35	38	37	31	34	25	29	24	298	694

Table 2

Methods Used in Educational Reseacher

	Year											
Method	78-87	88	89	90	91	92	93	94	95	96	97	88-97	Total
Descriptive	84	15	16	11	11	14	8	8	6	11	4	104	188
Bivariate correlation	11	1	1	0	2	1	0	1	0	0	1	7	18
t-test	2	0	1	0	0	0	0	1	0	0	0	2	4
Nonparametric	5	0	0	0	0	0	0	2	0	0	0	2	7
Meta-analysis	4	1	1	0	0	0	0	1	0	0	0	3	7
ANOVA/ANCOVA	6	0	0	0	0	2	0	0	1	0	0	3	9
Psychometric theory	5	0	0	0	0	1	0	0	1	0	0	2	7
Multiple reg./corr.	13	1	0	0	0	0	0	1	0	0	0	2	15
Multivariate	1	0	0	0	0	0	0	0	0	0	0	0	1
Factor/cluster	6	0	0	0	0	0	0	0	0	0	0	0	6
LISREL	1	0	0	0	1	0	0	0	0	0	0	1	2
Bayesian	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulation	0	0	0	0	0	0	0	0	0	0	0	0	0
Modeling	0	1	0	0	0	0	0	0	0	0	0	1	1
Qualitative	0	0	0	0	0	0	0	0	0	0	0	0	0
Graphic methods	NA	5	9	2	2	5	3	2	1	2	2	33	33
Total articles reviewed	347	33	35	47	40	45	41	44	43	60	40	428	775

Table 3

Methods Used in Review of Educational Research

Method	Year												
	78-87	88	89	90	91	92	93	94	95	96	97	88-97	Total
Descriptive	5	0	0	0	0	0	2	0	0	0	1	3	8
Bivariate correlation	2	0	0	0	0	0	0	0	0	0	0	0	2
t-test	0	0	0	0	0	0	0	0	0	0	0	0	0
Nonparametric	1	0	0	0	0	0	0	0	0	0	0	0	1
Meta-analysis	21	6	5	3	2	4	4	2	5	5	10	46	67
ANOVA/ANCOVA	0	0	0	0	0	0	0	0	0	0	0	0	0
Psychometric theory	2	0	0	0	0	0	0	0	0	0	0	0	2
Multiple reg./corr.	0	0	0	0	0	0	1	0	0	0	0	1	1
Multivariate	0	0	0	0	0	0	1	0	0	0	0	1	1
Factor/cluster	0	0	0	0	0	0	0	0	0	0	0	0	0
LISREL	0	0	0	0	0	0	0	0	0	0	0	0	0
Bayesian	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulation	0	0	0	0	0	0	0	0	0	0	0	0	0
Modeling	0	0	0	0	0	0	0	0	0	0	0	0	0
Qualitative	2	0	0	0	0	0	0	0	0	0	0	0	2
Graphic methods	NA	0	0	0	0	0	1	0	0	0	6	7	7
Total articles reviewed	223	19	29	24	21	20	26	16	17	25	17	214	437

Table 4

Methods Used in the Three Journals Combined

Method	Year												
	78-87	88	89	90	91	92	93	94	95	96	97	88-97	Total
Descriptive	117	16	16	13	13	16	11	10	7	19	8	129	246
Bivariate correlation	60	8	2	5	7	3	2	3	5	3	1	39	99
t-test	44	4	5	4	3	0	2	4	2	2	0	26	70
Nonparametric	52	0	3	0	4	3	2	7	2	0	2	23	75
Meta-analysis	38	7	6	3	2	4	4	3	5	5	10	49	87
ANOVA/ANCOVA	143	10	7	8	11	10	7	7	7	5	6	78	221
Psychometric theory	19	0	0	2	1	1	0	0	1	0	0	5	24
Multiple reg./corr.	108	4	3	2	4	3	4	3	8	6	3	40	148
Multivariate	54	4	3	4	7	3	4	2	4	1	2	34	88
Factor/cluster	36	0	1	2	0	2	3	5	5	1	5	24	60
LISREL	39	4	3	4	4	4	0	1	3	0	2	25	64
Bayesian	1	0	0	2	0	0	0	0	0	0	0	2	3
Simulation	3	0	0	0	0	0	0	0	0	0	0	0	3
Modeling	4	1	1	1	0	0	0	1	0	0	0	4	8
Qualitative	6	5	8	8	11	16	12	7	9	13	7	96	102
Graphic methods	NA	5	9	4	6	5	7	2	1	9	10	58	58
Total articles reviewed	966	80	81	106	99	102	98	94	85	114	81	940	1906

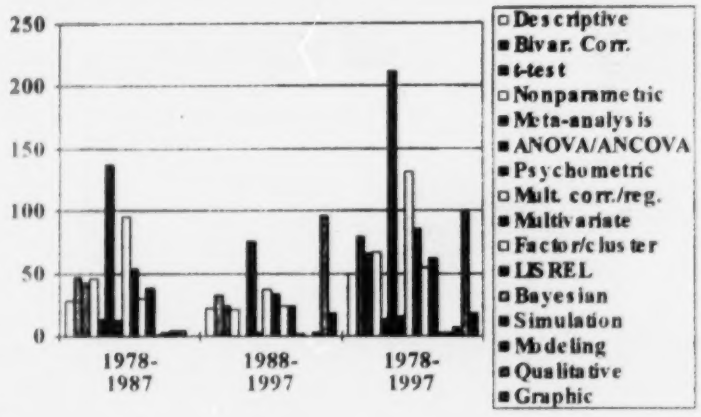
Table 5

Rank Order of Methods Used in American Educational Research Journal, Educational Researcher, Review of Educational Research, and The Three Journals Combined

Method	Journal and Time Period											
	AERJ 78-87	AERJ 88-97	AERJ 78-97	ER 78-87	ER 88-97	ER 78-97	RER 78-87	RER 88-97	RER 78-97	Total 78-87	Total 88-97	Total 78-97
Descriptive				1	1	1				2	1	1
Bivar. Corr.	4	5	5	3		3				4		5
t-test	6	7										
Nonpar.	5		6							6		
Meta-analy.							1	1	1		5	
AN(C)OVA	1	2	1							1	3	2
Psychometric												
Mult. reg.	2	3	2	2		4				3	6	3
Multivariate	3	4	4							5		6
Factor/cluster		7										
LISREL		7										
Bayesian												
Simulation												
Modeling												
Qualitative		1	3								2	4
Graphic	NA			NA	2	2	NA			NA	4	

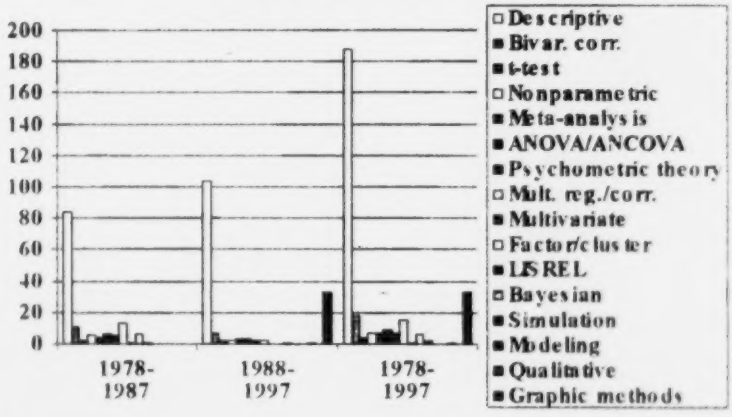
Note: Only the top six qualitative/quantitative techniques were ranked for each journal for each time period. A technique had to have a frequency of at least 10 to be ranked.

Methods Used in American Educational Research Journal



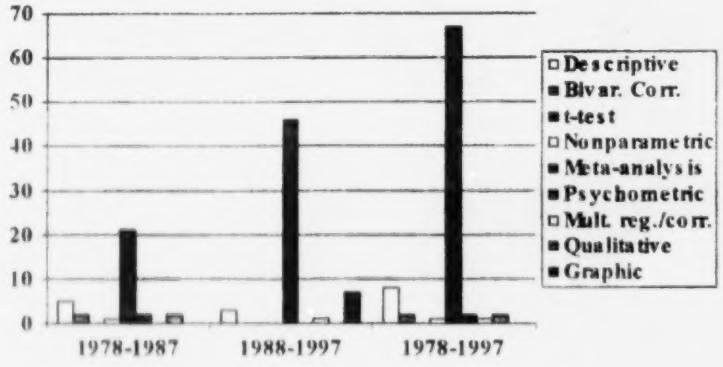
PBE & PLW 9

Methods Used in Educational Researcher

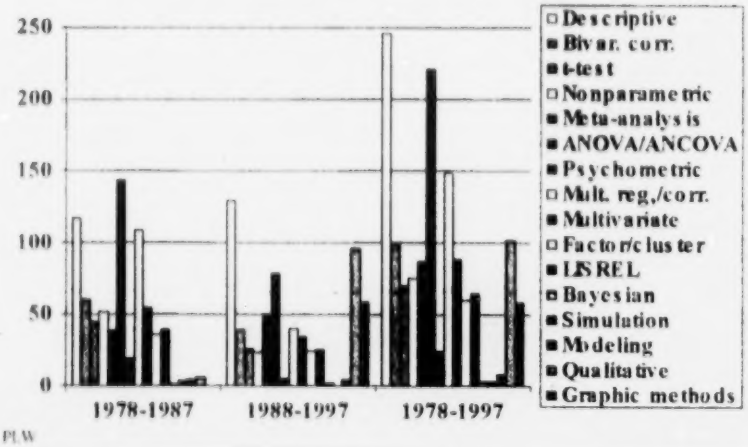


PBE & PLW 10

Methods Used in Review of Educational Research



Methods Used in the Three Journals Combined



Rank Order of Methods 1978-1987

AERJ	ER	RER	All
ANOVA	Descriptive	Meta-analysis	ANOVA
Mult reg./corr.	Mult reg./corr.		Descriptive
Multivariate	Bivar. corr.		Mult reg./corr.
Bivar. corr.			Bivar. corr.
Nonparametric			Multivariate
t-test			Nonparametric

Rank Order of Methods 1988-1997

AERJ	ER	RER	All
Qualitative	Descriptive	Meta-analysis	Descriptive
ANOVA	Graphic		Qualitative
Mult reg./corr.			ANOVA
Multivariate			Graphic
Bivar. corr.			Meta-analysis
t-test (etc.)			Mult reg./corr.
Factor, cluster (etc.) LISREL (etc.)			

Rank Order of Methods 1978-1997

AERJ	ER	RER	All
ANOVA	Descriptive	Meta-analysis	Descriptive
Mult reg./corr.	Graphic		ANOVA
Qualitative	Bivar. corr.		Mult reg./corr.
Multivariate	Mult reg./corr.		Qualitative
Bivar. corr.			Bivar. corr.
Nonparametric			Multivariate